

API 170 – Recommended Practice for Subsea High Pressure Protection Systems (HIPPS)

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Agenda

- Introduction and background
- HIPPS overview
- Codes and standards
- Regulatory issues
- API 170 - HIPPS
- Conclusions

Introduction

- Subsea HIPPS predominantly in North Sea
- GoM seeing increasing reservoir pressures and temperature in deep water
- No regulatory framework in GoM
- Presentation covers:
 - Key differences
 - API 170 RP
 - Work with regulatory authority (MMS/BSEE)

Background

- HIPPS is a key enabling technology
- Impact of increased water depth on systems
- Impact of high flow rate wells
- Lack of clear position by MMS/BSEE

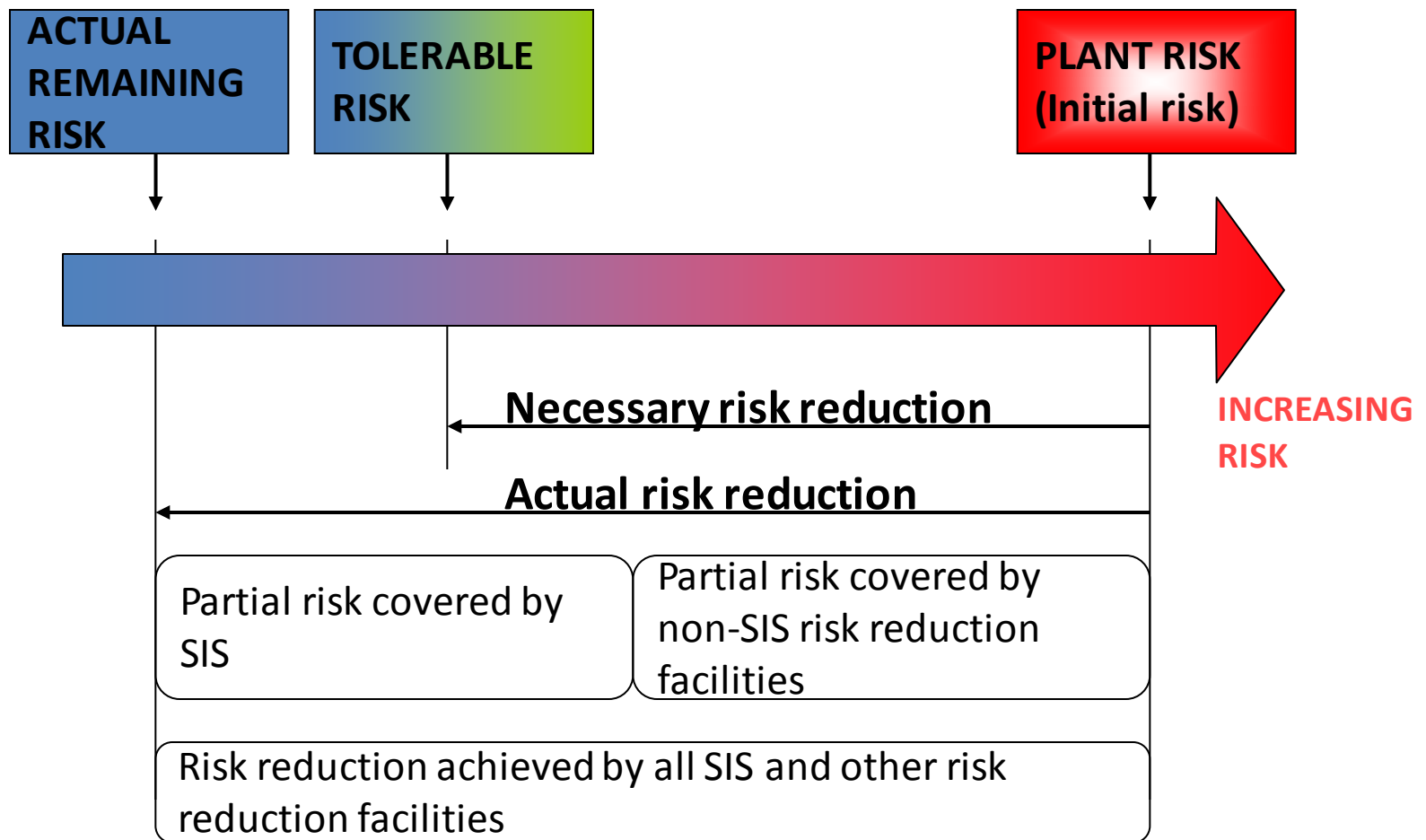
Background contd

Project	Operator	Location	Fluid	Installation
Kingfisher	Shell	North Sea	Gas	1997
Gullfaks	Statoil	North Sea	Oil/Gas	2000
Penguins	Shell	North Sea	Oil	2002
Juno	BG	North Sea	Gas	2002
Kristin**	Statoil	North Sea	Gas	2005
Rhum**	BP	North Sea	Gas	2005

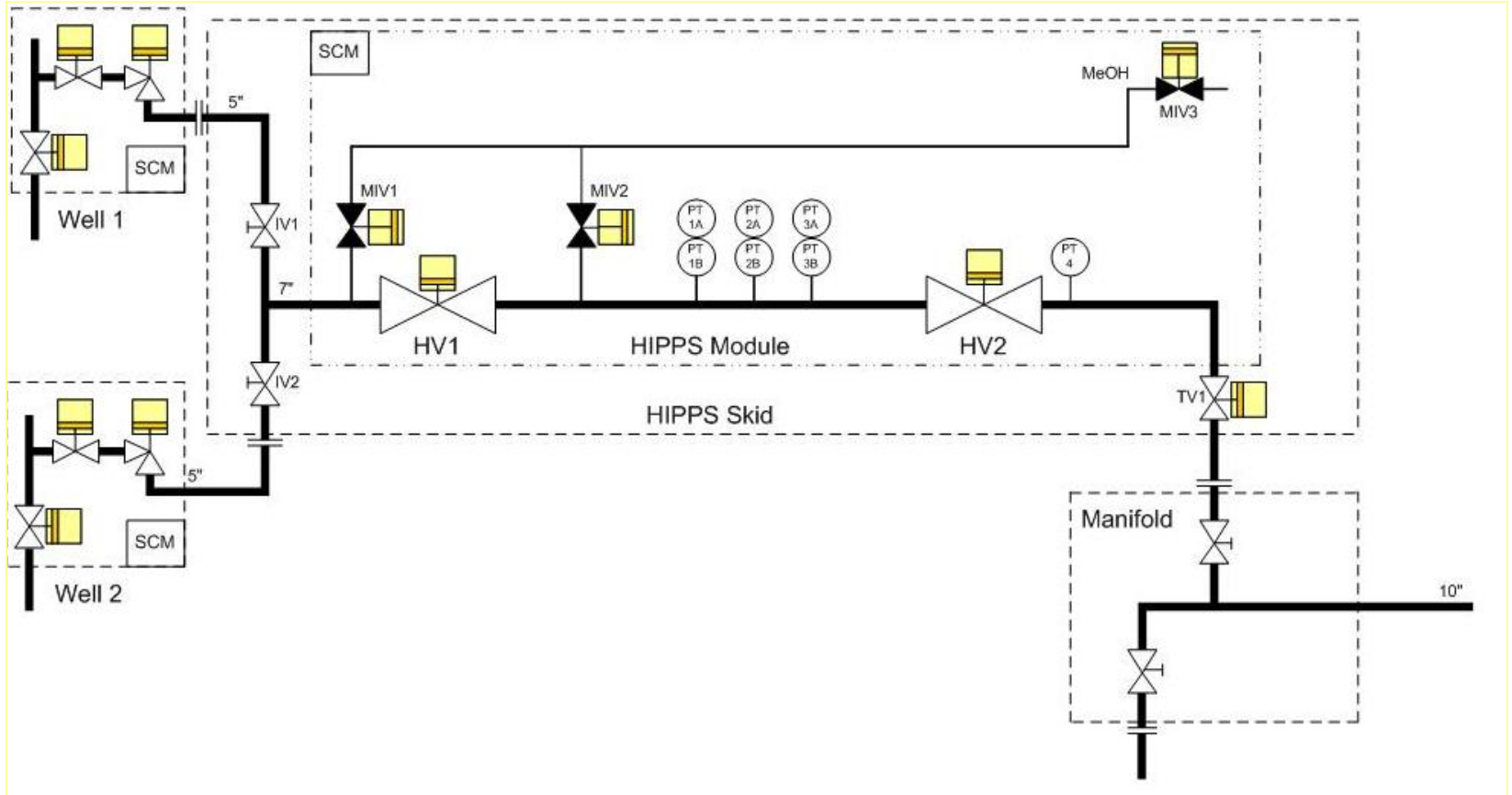
- Globally ~20 projects with HIPPS installed
- GoM is different to the North Sea
 - North Sea projects do not perform routine subsea valve leak tests (routine annual maintenance shutdown only)
 - Regulatory approval based on safety cases

Benefits of HIPPS

- Reduce topside pressures:
- Reduce flowline and riser wall thickness;
- Reduced offshore welding time;
- Reduced temperature induced axial force
- Improved riser design; and
- Potential to use existing, lower pressure flowlines and risers.



HIPPS components



Codes and standards

- GoM based on proscriptive approach
- IEC 61508 & 61511 (risk based approach) –ISA 84
- API 14C (traditional approach)
- API 17O – HIPPS – Published 2009

Regulatory issues – in the past

- Unknown requirements leading to HIPPS not being selected in a number of projects
- DeepStar regulatory committee
- New Technology Application

Current position with BSEE

- NTA March 2006, approved July 2006
- BSEE plans to use the DWOP process to approve a HIPPS project
- First HIPPS application being developed for GoM - Julia

BSEE Position

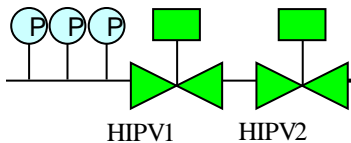
- SIL 3 rated
- Fail safe
- Failure away from facility
- Quarterly function test, partial stroking not accepted
- Zero leakage for HIPPS valves
- Closure on loss of communication or power
- Redundant pressure sensors

API 170 Typical HIPPS

SIL 3 system with two valves

Designed to be tested to zero leakage (some leakage may be tolerated due to the inclusion of a surface PSV)

HIPPS could be mounted on the tree, Jumper or manifold



HIPPS

No burst zone designed to allow sufficient time for the HIPPS valves to close

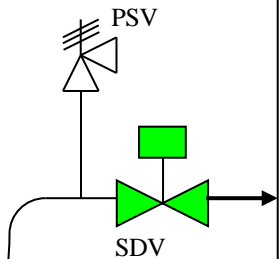
Subsea Fortified Zone

Protective Segment Section

Fortify zone designed to protect the host

Designed to ensure that the Protective Segment fails before the riser

A PSV is included to prevent valve leakage over pressurizing the system during platform abandonment



Host Fortified Zone

API RP 170 - HIPPS

Operators

Anadarko
BP (Chair)
Chevron
Devon
Hess
Murphy
Nexen
Shell
StatoilHydro
Williams

US Government

BSEE

HIPPS Suppliers

Aker Solutions
Cameron
Dril Quip
FMC
GE

Engineering Cos

Creative Systems International
Intec
J P Kenny
KBR
Paragon
Stress Subsea
Technip

Conclusions

- Systems available for 15,000 psi
- First project now appearing in GoM
- HIPPS is an enabling technology for deep water HP
- Regulatory position is now well understood, still need NTL
- API 170 Published 2009
- API 170 revision being balloted as a Standard

Questions?